Teaching Suggestions: Geology Activity #4

Mineral Hunt

Background Information:

There are many different types of granitic rocks in North America. In Yosemite they all contain two basic mineral families (feldspars and quartz), and they can have smaller amounts of biotite mica and hornblende. Quartz and feldspar are light-colored, and hornblende and biotite mica are dark-colored. Granitic rock in Yosemite differs in the proportion of the four minerals in it and in the size of the mineral crystals.

The type of granitic rock found in the east end of Yosemite Valley and along Mirror Lake Trail is Half Dome granodiorite, a dark granitic rock. Half Dome granodiorite has quartz, some feldspar, large well-formed hornblende crystals, and some biotite mica. The hornblende and biotite mica crystals in the granodiorite rocks in the sand along Mirror Lake Trail are quite large and easy to identify and are also easy to spot in the large boulders.

The four minerals in Yosemite granitic rock differ in their identifying characteristics.

- Quartz forms a 6-sided crystal and can be opaque-white to clear with a grayish tint.
- Feldspar can be a light pink or milky white to rose color and forms a squashed square-shaped crystal. If held to the light, the sides of feldspar crystals appear shiny.
- Biotite mica crystals can be a brown to black and can have a gold tint that some mistake for gold when it's found in rivers. Biotite mica often appears hexagonal and its thin, flexible, layered plates can be peeled off with a fingernail.
- Hornblende is much harder than biotite mica, is dark green to almost black, and commonly has elongated rod-shaped crystals.

Note: Well-formed hornblende and biotite mica crystals are visible in Half Dome granodiorite along Mirror Lake Trail. Feldspar and quartz crystals are not. To identify these minerals in the sand and rock, look for their identifying colors.

Concepts:

- Identification of the four minerals in Yosemite granitic rock by color, description, and crystal shapes for hornblende and biotite mica.
- Distinguishing Yosemite granitic rock from different colored minerals (quartz and feldspar).
- Distinguishing Yosemite granitic rock from individual mineral crystals (hornblende and biotite mica).

Vocabulary:

quartz, feldspar, hornblende, biotite mica

If You are Taking the Virtual Hike

Students are asked to identify the four minerals in granite (with four different questions) by examining photographs of minerals found in the sand. Students have two tries to answer correctly. The program presents immediate feedback and suggests a hint after a first incorrect answer.

If You are Visiting the Park and Hiking the Trail

Materials:

- a few samples of each of the four minerals in granitic rock: biotite mica, feldspar, quartz, and hornblende
- hand lenses (one per student or one per pair of students)

- four laminated cards, each with a name and drawing of one of the four minerals in Yosemite granitic rock

Site:
Mirror Lake Trail stop #4. See the map with a photograph of the telltale giant flat rock that indicates the spot. The online activity also contains a photograph. There is a great deal of sand all around this rock that students can examine.

Time:
15 minutes

Activity:
Let the students know they will be going on a mineral hunt. First they need to know what the minerals look like so that they can find them. Pass out the hand lenses. Introduce each of the four minerals found in granitic rock: biotite mica, hornblende, quartz, and feldspar. Describe each of the four mineral samples using the name, colors, and general shape of each. Pass around a few samples of each mineral so that the students can get a closer look with their hand lenses.

You can also challenge students to find the minerals in small granite rocks lying in the sand and in the cliff walls. Find all four types of minerals.

As a conclusion and review ask a few students to share the minerals they found, naming each and describing how the minerals look under hand lenses. They should be able to identify the hornblende and biotite mica minerals in the sand by their colors and possibly by their crystal shapes. The biotite mica may be present as well-formed hexagonal crystals and the hornblende may appear as needle-like or rod-shaped crystals. They will only be able to identify the quartz and feldspar minerals by color. These lighter colored minerals do not have well developed crystals in Half Dome granodiorite.

Return the minerals to the trail.